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brings out forcibly the fact that almost every reaction of an animal involves or is conditioned by the activity of the total organism. The tropism theory is misleading in so far as it seems to suggest that local action, largely independent of the conditions of the body as a whole, is the common rather than the exceptional determinant of reaction. In this portion of the volume it is evident that Jennings is emphasizing the unknown factors in animal behavior, while at the same time severely criticizing those observers and theorists who contend that they can reduce organic activity to physical factors.

Trial and error is the method of adaptive reaction which is most frequently observed in the lower organisms. In a discussion of this topic the author is drawn into a discussion of the meaning of 'error': "There is no common thread running through all the different agents which constitute 'error' in the reaction, save this one, that they *are* error from the standpoint of the general interests of the organism. * * * Why do we receive without opposition certain chemical stimuli and avoid others? The facts are quite parallel in man and in the lowest organisms in these respects. * * * In both cases the stimuli producing the negative reaction are in general injurious to the organism (p. 247).

"In ourselves the stimuli which induce the negative reaction bring about the subjective state known as *pain*, and popularly we consider that the drawing back is due to pain. Is there ground for this view? Or is the reaction entirely accounted for by the chemical and physical processes involved? * * * If we hold that in man we can not account for the reaction without taking into consideration the pain, then we must hold to the same view for the lower organisms. * * * Any one who holds that we can account fully for the reactions of *Euglena* or *Paramecium*, purely from the physico-chemical conditions, without taking into account any states of consciousness, must logically hold that we can do the same in man. The method of trial and error implies some way of distinguishing error; the problem is: How is this done? The problem is

one, so far as objective evidence goes, throughout the animal series" (p. 248).

The criticism of this volume, as of many of Professor Jennings's other writings, that one is first inclined to make is that there is needless repetition, that the same simple facts are described and redescribed until one almost feels it an insult to intelligence. But this is a judgment which the author has passed upon himself, for he has elsewhere stated that he describes all his observations in almost painful detail in order that investigators who have cause to use his results may not have the disagreeable experience, that has been his often, of failing to find in the description of experiments some little point that is important for the problem in hand. Apart from its repetitions, the volume is well written; it is also well printed.

As to the content of the work, it may be repeated that the evidences of thoroughness, accuracy, fairness to other investigators, freedom from overhasty generalizing, are such as to inspire great confidence in the results, and to warrant one in believing that they will serve to advance our knowledge of the general subject of animal behavior in a very important manner. In fact, it is not at all improbable that they may necessitate important modifications in the tropism theory.

ROBERT M. YERKES.

HARVARD UNIVERSITY.

RECENT BOOKS ON ECONOMIC AND SOCIAL SCIENCE.

Principles of Economics, with applications to Practical Problems. By FRANK A. FETTER, Ph.D. New York, The Century Co. 1904.

The United States and Porto Rico, with Special Reference to the Problems Arising out of our Contact with the Spanish-American Civilization. By L. S. ROWE, Ph.D. New York, Longmans, Green & Co. 1904.

Problems of the Present South. By EDGAR GARDNER MURPHY. New York, The Macmillan Company. 1904.

Russia, Her Strength and Weakness, A Study of the Present Conditions of the Russian Empire, with an Analysis of the Resources and a Forecast of its Future. By WOLF VON SCHIERBRAND, Ph.D. New York, G. P. Putnam's Sons. 1904.

America, Asia and the Pacific, with Special Reference to the Russo-Japanese War and its Results. By WOLF VON SCHIERBRAND, Ph.D., with thirteen maps. New York, Henry Holt & Co. 1904.

Greater America. By A. K. COLQUHOUN, F.R.G.S. With Maps and Diagrams. New York, Harper and Brothers. 1904.

Dr. Fetter's 'Principles of Economics' will rank high as a text-book. In technical equipment and class-room experience few men are better fitted than he. The most valuable parts of the book to the student of theory are to be found in those chapters in which he has recast many of the conclusions of economic thought, based on a much wider scope of generalization than is usually credited to earlier writers on economic principles. There is also a larger blending of the historical with the scientific method of treatment; the author has, therefore, been able to work out the various theories far more in harmony with facts than many of his predecessors have done. He has also shown the effect of statistical material upon the statement of principles. On the whole, his hope has been realized—'to further sound economic reasoning and to extend among American citizens a better understanding of the economic problems set for this generation to solve.' There are some parts of the volume, however, which, like the early words of the foregoing quotation, leave one in doubt as to just what is meant.

Dr. Fetter treats the subject from a standpoint of the study of values, as constituting the core of economic science. Values, according to his view, have an objective as well as a subjective aspect, and his classification is divided into three main heads: Values of material things, of human services, and social aspects of values, under each of which are a series of subheads, as indicated by the following outline:

I. Value of material things: Wants and present goods, wealth and rent, capitalization and time-value.

II. Value of human services: Labor and wages, enterprise and profits.

III. Social aspects of value: Relation of

private income to social welfare, relation of the state to industry.

The measure of success is highly encouraging in the effort to apply principles to the discussion of problems. The questions and critical notes add materially to the value of the volume, showing that the author has fully appreciated the position of the student.

From the standpoint of scientific method less can be said. There is much more to be done before economic science, in the United States especially, shall have shifted its center of gravity from theoretical speculation to strictly scientific research. At the present time there is a great deal of restlessness at the barrenness of economic science, largely due to the too general prevalence of the speculative methods of treatment.

Economists, as a rule, have not felt called upon to be scientists; they have more often played the rôle of speculative inquirers, of economic philosophers—of privileged thinkers in a field over which their authority has gained in proportion to their regard for facts, rather than for theories applied to conditions which no longer exist, or which exist in no such degree as the theories imply. Thus it happens that chemistry, technology, geology and other sciences of economic content have gradually undermined popular confidence in economists. In many cases the engineer, for example, is more of an economist than the most orthodox professor of economics, because *his* judgment, and not that of the economist proper, has guided economic development.

'The United States and Porto Rico,' by Professor L. S. Rowe, of the political science faculty, University of Pennsylvania, and lately of the Porto Rican Code Commission, deals more generally with the political aspects of American influence in the West Indies. His volume has special reference to the problems arising out of our contact with Spanish-American civilization. While it is true that he looks at the subject chiefly from the legal standpoint, he has brought into order clear recognition of the social and economic conditions which have dominated government. The author shares the national hopefulness, as expressed in the final paragraph:

Whether we view the progress of the island from an industrial, political or social standpoint, the conditions are singularly favorable for the successful solution of the new problems presented by our Spanish-American possession in the Caribbean. The lessons that we are learning will be of service to us in the larger tasks that are before us. Future generations will look upon the experience acquired in the administration of civil affairs in Porto Rico as a period of training and preparation for the problems involved in our relations with the Spanish-speaking peoples of the American continent.

The chapter on 'The People' is most instructive. Of the population two fifths are colored, the island having a larger proportion of whites than most of the southern states. Three fifths of the people are engaged in agriculture, and the average *area per farm* is 45 acres compared with 146.2 acres in continental United States. Illiterates constitute 22.7 per cent. of the population, excluding all under ten years. An educational test, if applied to suffrage, would have excluded 76 per cent. of the males. The island's revenue is \$2,500,000 (1903). Of the total income, local and insular, 28 per cent., or over one fourth, is applied to public education—an unusually large proportion, probably larger than that of any other community.

'Problems of the Present South, or a Discussion of Certain of the Educational, Industrial and Political Issues in the Southern States,' by Edgar Gardner Murphy, of Montgomery, Alabama, is a statement of the *rationale* of the southern policy in relation to the great pivotal questions of modern society, such as democracy, education, nationalism, industrialism, culture and the race question. Mr. Murphy succeeds well in his task. He has done good service in bringing thoughtful people back to the idea that the south is not attempting to solve its great social problems in a way which is out of line with national aspiration.

The chapters on the 'Schools and the People' and 'Constructive Statesmanship,' as well as that on 'Culture and Democracy,' must convince the reader that here is one at least who interprets southern life in the light of its faith in the progress of the people as a whole.

The author seems to have made good use of statistical resources generally. There is some doubt, however, as to the value of the statistics of the census of 1870, many of which are confessedly unsatisfactory, so far as they relate to the southern states. Nor is it quite right to charge up the loss of private property through emancipation as a total loss to the south as a whole. The value of the slave population to the community was transferred from private account to public account, though the transfer caused a considerable depreciation in value, it is true, especially at the start. The great loss in economic resources came through the destruction of war and not through emancipation.

An instructive part of the exposition here given is that which relates to the growth of cities in the south. The author speaks very appropriately of the population of the southern states as being under-municipalized. The fact that the population of the south is predominantly rural, renders all the more formidable the problem of illiteracy. As he points out, however, the schools, in spite of all their difficulties, are gaining on illiteracy. There is not a state in the south which is not largely reducing its illiteracy. Within the years 1880 to 1900 there was a marked progress in this respect. In New York and Pennsylvania and Massachusetts the total number of male illiterates increased perceptibly within this period. Illiteracy, therefore, is not a sectional, but a national problem; more than six millions of our people can not read and write. In the chapter on 'Industrial Revival and Child Labor' the author cuts the ground out from under the opponents of constructive legislation by regarding children as an educational rather than as an industrial asset.

Wolf von Schierbrand's volume on 'Russia, Her Strength and Weakness,' is a vivid description of economic and social conditions, studied from the standpoint of Russia as an expanding world power. While the work is highly instructive, in fact one of the best short volumes on this most interesting people, some of its statements evidently need qualification. It is a mistake, for instance, to say that there has not been any industrial

progress in Russia for the space of one hundred and fifty years. The author deals intelligently with Russia's relation to Asia. It is the trend of this part of imperial policy which, in his view, shackled economic progress in European Russia.

In the light of the increasing national debt, Russian finances are analyzed and the effect shown of the debt upon the industrial development of the country. Numerous foreign loans have made it necessary to export more largely than ever in order to pay the interest on public obligations. Lack of private initiative has made it necessary for the government to enlarge its economic functions by absorbing its industries, transportation facilities and such mercantile pursuits as the liquor traffic. The extensive borrowing from abroad has brought into the industrial life of Russia a large number of captains of industry of foreign origin. These industries are, therefore, grafted upon from outside, rather than an organic growth from within the nation; hence they are of an unsatisfactory character from the standpoint of profits. Not only has industry suffered severe relapse, but agriculture, still the essential feature of Russian enterprise, finds nearly every one of its economic features exhausted. The peasant population as well as the landlords are without the surplus return necessary to keep up the land, the soil of the black belt is decreasingly remunerative and peasant wages average ten cents per diem—an index to growing poverty.

The decay of the nobility has left rural life without its earlier leadership. Absenteeism is a curse here, as formerly in Ireland. The church is no longer the vitalizing force in the life of the people and their morals it might be reasonably expected to be. Much is anticipated from the growth of a middle class. The government finds itself between the nether millstone of internal strife and the upper millstone of endeavor to Russify the foreign population. The course of progress is checkered by the ruling classes aiming to get control of the bureaucratic system, each to carry out a different program.

The chief reforms needed, according to this analysis, are the abolishment of the Mir, en-

largement of the powers of provincial chambers and greater local autonomy.

This book is strikingly similar in narrative and incident, to the excellent volume of von der Brüggén entitled '*Das Heritige Russland*,' published a few years ago in Germany. Probably the main criticism of the book is that the author has used his observation admirably, but has not equally well cultivated the art of appreciative insight.

In the classification of our libraries there is a rapidly increasing output of books on the subject of the world's politics. The center of interest in this sphere of international activity is invariably found in the subject of markets. Industrially equipped as national society is now, each of the leading industrial powers is interested in enlarging its foreign markets. If in ten months the industrial equipment of such a nation can supply enough for home needs in any particular commodity, this particular industry has before it the alternative of two months of idleness or of finding markets capable of absorbing the surplus. The former alternative spells industrial depression; the latter, commercial expansion. This is the argument as applied to the United States, which pervades von Schierbrand's recent volume on '*America, Asia and the Pacific*.' His thesis is by no means novel—'that the Pacific during this century is bound to become what the Atlantic was during the eighteenth and nineteenth and the Mediterranean during the twenty-five centuries preceding.' For the rôle of leadership the competition lies among Great Britain, Russia, Japan and the United States. "The United States is the nation best equipped for the coming race in the Pacific. American expansion in the Pacific is something absolutely necessary to safeguard our further national development, and to preserve us from the curse of the ill-balanced production and all its attendant evils." The peg on which the author hangs so many arguments in the grouping of his facts is the Panama Canal.

It is useless to talk about our commercial supremacy in the Pacific, which is the author's major theme, with the insignificant ocean-going tonnage now afloat under the American flag. There is no economic justification for

this vaunting ambition to rule the seas. As one of the elements of the Pacific problems this deficiency in a merchant marine is being recognized, but not by any means with deserving importance, as part of the program laid down for the author's adopted country to follow. In this view it is naval efficiency, not a merchant marine, which shall dominate in the development of the Pacific and of the people on its shore frontage east and west. Is it not, however, a strange reversal of economic reasoning to say that, given a navy, a carrying trade will follow?

Moreover, out of the few lines of shipping of American registry it is the exception to find one that is on a sound paying basis. This is particularly true of lines on the Pacific. The fact is that a naval policy such as the United States is now carrying out only indirectly contributes to the creation of a merchant marine. It has resulted in developing the industry of iron and steel shipbuilding and thus contributed to the reduction of the initial cost of inaugurating this industry. But it does not seem to have reduced the comparative cost of producing ships at home. It has likewise created a prestige for the country and thus for its commerce in foreign parts. But apart from these advantages of a subsidiary character, a big navy is no guarantee of a big carrying trade on the ocean. It is quite too much to assume, as the author does, that with a navy the revival of our shipping will come of its own accord (p. 315).

The public must nevertheless recognize in this volume a penetrative insight into the economic possibilities of Russia in her relation to the United States. Possibly most recent books on Russia have been written from the official car-window standpoint. Here the chapter on 'Little Known Facts about Russia' (pp. 128-139) is worth whole volumes of sophomoric travels.

Russia's conquest by railroad has been for the purpose of opening an ice-free port and of closing Asiatic territory against foreign trade, the more effectively to control the economic processes of her internal policy. From this basis her influence in the Pacific as a competitor with the United States has to be fore-

shadowed. "It is quite safe to say," says von Schierbrand, that, "as economic enterprises, these Manchurian roads will prove even more pronounced failures than the Trans-siberian has so far proved." Viewing them merely from the angle of Russian aggressive policy, of military strategy, and as a visible sign of Russia's expanding political power, they may, however, prove a success. On the other hand, even in this limited sense, they may eventually become a white elephant for Russia. The final issue of this present war will determine that question. For a country so poor in capital as Russia, a country with a home population whose most crying material needs are insufficiently supplied, these Manchurian roads are, economically considered, a gigantic folly."

Nevertheless, by a system of rebates on exports and of bounties in the form of reduced railway rates to the frontier, Russia has again and again succeeded in establishing and holding a footing in some of the markets supposed to be largely in control of her competitors. Hence the author probably takes too short a period of time into account as the basis of this conclusion.

Colquhoun's 'Greater America' is an incisive analysis of the subject of geographical expansion of the United States and the political and economic problems and responsibilities arising therefrom. Whoever has read his 'Mastery of the Pacific,' 'China in Transformation' and 'Overland to China' will recognize the well-reasoned weighing of essential facts and relations in which this work abounds. The shifting of the center of gravity of world politics from the Atlantic to the Pacific has everywhere raised the question, What part shall America play? 'Greater America' is more than continental United States; Greater America is a world power with problems of imperial importance upon her hands. It is in this latter rôle that a new class of social and economic problems is presented to the United States. They include political questions of foreign relations, of relations with alien peoples, of national defense, of government of dependencies. All of these in the author's view depend for right solution

on the efficiency and purity of administration. The *social* problems of America, as he presents the case, center chiefly around the worship of the golden calf (p. 4). The racial problem, the practical stagnation of the native born and the rapid increase among the poor aliens, make it advisable to take steps to preserve the ascendancy of the Anglo-Saxon type of America (p. 6). Otherwise an undesirable modification of national character will take place. The nation is now indescribably heterogeneous. At a time when its larger tasks require internal unity and progress (p. 23) the nation is harassed with problems of racial relations. With the Indians the result has been far from satisfactory. With the negroes, the racial adjustment is a 'burning' question. The only solution offered is educational; but American education is materialistic in its trend—a statement to which exception might well be taken. Instead of unity we have an ever-widening gap between capital and labor (p. 35).

In the chapter on America and colonization, the six motives of colonization are classified as trade, conquest, adventure, overflow of population, religious persecution and political rivalries—all of which have to some extent figured in the territorial expansion of the United States, from the Atlantic seaboard across the continent, thence to Alaska, to Hawaii, Samoa, the Philippines and Porto Rico, giving rise to two great extensions of control: (1) Pacific expansion and (2) Caribbean expansion. In both of these the greatest problem is that of dealing with alien races.

In the Philippines the author contends that our idealism has led us to overlook the common sense requirements of the situation (p. 111); the Philippines wanted peace, good government and commercial prosperity; America has given them institutions and legislation; after three years' occupation not one yard of railroad has been begun; only one wagon road is in process of construction; no canals nor deepening of rivers has been undertaken, nor any improvement of harbors, except at Manila (p. 109). This seems to be rather a one-sided judgment. Certainly the Philippines have been given peace. Certainly the best govern-

ment they have ever had has been given them, and the basis laid for commercial prosperity by the settlement of the land question, which was one of the chief causes of the revolt under Spanish rule.

In the Caribbean expansion of the United States, Cuba and Mexico are the two great considerations. The economic dependence of the one and the economic absorption of the other will be accelerated by the construction of the Panama Canal. But the problematic aspect of Caribbean expansion is the fate of the holdings of European states in this part of the world.

'Great Britain apparently can not help her island colonies. America does not want them.' The trans-isthmian canal, however, enhances their value to the owners of the West Indies, strategically. The hope of closer affiliations with Canada is still regarded as a realizable solution, because the two countries are economically complementary. For Great Britain the Caribbean question is a crucial one. Will these islands between the upper millstone of American indifference and the nether millstone of British inability to give them economic prosperity ultimately fall under the control of America? Cuba the author regards as so incapable of working out her economic salvation that without American energy and capital the island can not be developed. But though the United States gave Cuba education and sanitation, she has not been able to emancipate herself from an economic depression which may yet force the island to seek incorporation into the Union. "Are the other Caribbean islands to go the way of Cuba?" (p. 190). Are the Central republics to pass within the sphere of American control? And if so, what stands in the way of a still wider sweep of Pan-Americanism embracing Canada and the southern continent? In the chapter on Canada and Pan-Americanism the commercial situation is considered as requiring that people to have reciprocity either with the United States or with Great Britain. The United States rendered futile two earnest efforts by Canadian commissions (1891 and 1896) to establish reciprocal trade relations with us. Meanwhile the trend of Canadian

economic development has been toward closer relations with Great Britain and away from the United States. Now if reciprocity is wanted it has to be paid for at a higher price. Great Britain is bending her efforts to aid Canada in her ambition for economic independence of the United States.

One of the ominous signs of the times is the increasing dependence upon navies as a factor in commercial competition. "There can be no question that naval expansion is the dominant note in world policy to-day." Here we are brought face to face with the purpose for which this book was written, namely, to rouse America to the realization that her scope of development as a commercial power in the Pacific depends on her attitude toward the Russian policy of territorial expansion over Chinese territory. Russia's ambitions "may be briefly summed up as being chiefly inimical to the United States in that they are essentially monopolistic. * * * Russia with her program of territorial expansion, military achievements, closed ports, autocratic government and non-progressiveness is a menace to the world" (p. 358).

The assured sovereignty of China seems to be the only basis of permanency to far eastern peace and prosperity (p. 381). The breaking up of China would jeopardize Japan's position, because it would mean an ascendancy of Russia and her sympathizers, Germany and France. In our author's view Russia's advance long since passed the defensible limit where British and American interests are impaired. These two interests he groups under the term Anglo-Saxon, and asks:

What course can be suggested which would best serve the interests of Anglo-Saxondom? * * * Were her expansion the legitimate expression of internal growth and progress, as has been that of the United States, it would be unreasonable to adopt a hostile attitude towards it. Even from the point of view of ethics the territory hitherto conquered or annexed by Russia is probably better off under her than under half savage khans. But Russia's expansion is no longer legitimate. She has reached her objective, the Pacific Ocean, and has not paused to develop or organize the vast territories she has occupied; she has in no case laid the foundation of a future of freedom and

prosperity for the conquered peoples. She has already imposed a cast-iron system and planted military colonies to keep things in order. She has no excuse save her own insatiable ambition and land hunger.

JOHN FRANKLIN CROWELL.

WASHINGTON, D. C.

SCIENTIFIC JOURNALS AND ARTICLES.

IN the November number of the *Botanical Gazette* Edward C. Jeffrey describes a new fossil sequoia from the Auriferous Gravels (Miocene) of the Sierra Nevada Mountains. He emphasizes his previously expressed view that the sequoias have originated from the Abietineæ.—George H. Shull publishes the results of his second season's study of the place-constants for *Aster prenanthoides* at Clifton, Ohio. This second collection was made in 1903 from the same area that supplied material for a quantitative study in 1900. The bracts, rays and disk-florets were studied quantitatively and the results compared with those of the earlier study.—B. L. Robinson describes 'A New Sheep Poison from Mexico,' which proves to be a new species of *Bouchetia*.—Elias Nelson publishes three western species of *Agropyron*.—Conway MacMillan describes some very interesting British Columbian dwarf trees. They grow on the rocks close to the sea but outside the influence of the surf, and represent three species: *Picea sitchensis*, *Tsuga heterophylla* and *Thuja gigantea*. One of them was less than two feet high and was 68 years old; another less than a foot high was 86 years old; and the third about a foot high, with a trunk one inch in diameter, was 98 years old.—A. C. Life describes some interesting results from an injury to *Ambrosia*, the chief result being that the primordia usually producing stamens and ovules produced vegetative shoots.

WE learn from *The British Medical Journal* that arrangements have been made with the Syndics of the Cambridge University Press to begin the issue of a *Journal of Agricultural Science*, under the editorship of Messrs. T. H. Middleton, T. B. Wood, R. H. Biffen, and A. D. Hall, in consultation with other gentlemen. The journal will publish only definitely scien-